

**WHAT IS CLAIMED IS:**

1. A process for preparing  $17\beta$ -substituted 4-azaandrost-1-en-3-one compounds of the general formula (I):



where

R is hydroxyl, optionally substituted, linear or branched ( $C_1-C_{12}$ )alkyl or ( $C_1-C_{12}$ )alkenyl; phenyl or benzyl; an -OR<sub>1</sub> radical, or an -NHR<sub>1</sub> radical, or an -NR<sub>1</sub>R<sub>2</sub> radical;

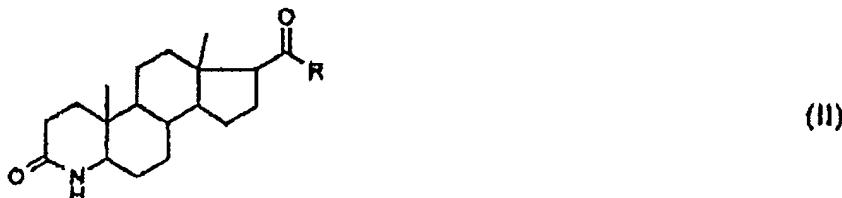
R<sub>1</sub> is hydrogen, optionally substituted, linear or branched ( $C_1-C_{12}$ )alkyl or ( $C_1-C_{12}$ )alkenyl, or optionally substituted phenyl;

R<sub>2</sub> is hydrogen, methyl, ethyl or propyl; or

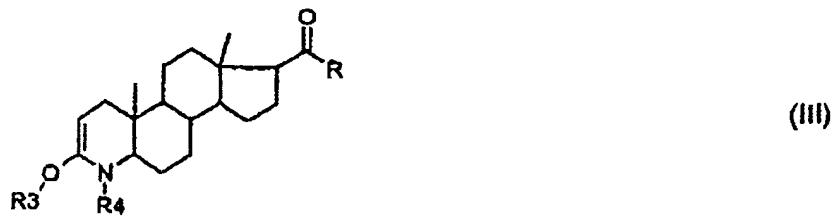
-NR<sub>1</sub>R<sub>2</sub> is a 5- or 6-membered heterocyclic ring, and when R = hydroxyl also a pharmaceutically approved salt thereof,

characterized in that

(A) protecting groups are introduced into the 3-keto-4-aza moiety (lactam moiety) of a compound of the general formula (II):



so that a compound of the general formula (III) is formed:



where

R<sub>3</sub> is trialkylsilyl or, together with R<sub>4</sub>, the -C(O)-C(O)- or -C(O)-Y-C(O)- radical;  
R<sub>4</sub> is alkyloxycarbonyl or phenyloxycarbonyl, preferably Boc (= tert-butyloxycarbonyl);  
or trialkylsilyl, or, together with R<sub>3</sub>, the -C(O)-C(O)- or -C(O)-Y-C(O)- radical;  
Y is -[C(R<sub>5</sub>)(R<sub>6</sub>)]<sub>n</sub>- or -CH(R<sub>5</sub>)=CH(R<sub>6</sub>)-, or ortho-phenylene;  
R<sub>5</sub> and R<sub>6</sub> are each independently hydrogen, linear or branched (C<sub>1-8</sub>)alkyl or alkenyl,  
optionally substituted phenyl or benzyl; and  
n is an integer of 1 to 4;

and where, in the case that R is hydroxyl, it has optionally reacted with a protecting group;

(B) the compound obtained [in step (A)] is reacted in the presence (i) of a dehydrogenation catalyst and in the presence of (ii) optionally substituted benzoquinone, allyl methyl carbonate, allyl ethyl carbonate and/or allyl propyl carbonate, and the Δ<sup>1</sup> double bond is introduced in the 1-/2-position, and

(C) the protecting groups R<sub>3</sub> and R<sub>4</sub> are removed and when R = hydroxyl the resulting compound is optionally converted to a salt.

2. The process as claimed in claim 1, characterized in that R is linear or branched (C<sub>1-C<sub>6</sub></sub>)alkyl, preferably methyl, ethyl, propyl or n-butyl, sec-butyl or tert-butyl, preferably tert-butyl; or an -OR<sub>1</sub> radical, or an -NHR<sub>1</sub> radical, or an -NR<sub>1</sub>R<sub>2</sub> radical, preferably an -NHR<sub>1</sub> radical, preferably -NH-tert-butyl, or optionally substituted phenyl.

3. The process as claimed in claim 1 or 2, characterized in that R<sub>1</sub> is linear or branched (C<sub>1</sub>-C<sub>6</sub>)alkyl, preferably methyl, ethyl, propyl, n-butyl, sec-butyl or tert-butyl, preferably tert-butyl.
4. The process as claimed in claim 1 or 2, characterized in that R is an -NHR<sub>1</sub> radical where R<sub>1</sub> is 2,5-bis(trifluoromethyl)phenyl.
5. The process as claimed in claim 1 or 2, characterized in that the R<sub>2</sub> substituent in the -NR<sub>1</sub>R<sub>2</sub> radical is methyl.
6. The process as claimed in claim 1 or 2, characterized in that the -NR<sub>1</sub>R<sub>2</sub> substituent as a 5- or 6-membered heterocyclic ring is a radical of piperidine or pyrrolidine.
7. The process as claimed in one of claims 1-6, characterized in that R<sub>3</sub> is trimethylsilyl, or, together with R<sub>4</sub>, is the -C(O)-C(O)- or -C(O)-Y-C(O)- radical.
8. The process as claimed in one of claims 1-6, characterized in that R<sub>4</sub> is alkyloxycarbonyl, preferably isobutyloxycarbonyl, tert-butyloxycarbonyl, tert-amyoloxycarbonyl, cyclobutyloxycarbonyl, 1-methylcyclobutyloxycarbonyl, cyclopentyloxycarbonyl, cyclohexyloxycarbonyl, 1-methylcyclohexyloxycarbonyl, preferably tert-butyloxycarbonyl.
9. The process as claimed in one of claims 1-8, characterized in that R<sub>4</sub> is Boc, trimethylsilyl, or, together with R<sub>3</sub>, the -C(O)-C(O)- or -C(O)-Y-C(O)- radical, preferably Boc or, together with R<sub>3</sub>, the -C(O)-C(O)- or -C(O)-Y-C(O)- radical.
10. The process as claimed in claim 9, characterized in that R<sub>5</sub> and R<sub>6</sub> are each independently hydrogen, linear or branched (C<sub>1</sub>-C<sub>4</sub>)alkyl, or phenyl, preferably hydrogen, methyl, ethyl or propyl or phenyl, preferably the -CH(R<sub>5</sub>)- radical or ortho-phenylene, preferably methylene, and n is 1 or 2, preferably 1.

11. The process as claimed in one of claims 1-9, characterized in that the compound of the general formula (II) for the introduction of the Boc protecting group is Boc anhydride or Boc carbamate or an analogous compound in which the tert-butyl radical is replaced by tert-amyl, cyclobutyl, cyclopentyl or cyclohexyl.
12. The process as claimed in one of claims 1-11, characterized in that the dehydration catalyst [in step (B)] is selected from compounds of group VIII of the Periodic Table of the Elements, preferably from compounds of iron, ruthenium and osmium; cobalt, rhodium and iridium; nickel, palladium and platinum; copper, silver and gold, preferably from compounds based on rhodium, palladium and platinum.
13. The process as claimed in claim 12, characterized in that the dehydrogenation catalyst [in step (B)] is selected from Pd(0) compounds, and is preferably the tris(dibenzylidineacetone)dipalladium-chloroform complex.
14. The process as claimed in claim 12, characterized in that the dehydrogenation catalyst [in step (B)] is selected from Pd(II) compounds, preferably from PdCl<sub>2</sub>, Pd(dppe)<sub>2</sub>, [dppe = bis(1,2-biphenylphosphino)ethane], Pd(dppe)Cl<sub>2</sub>, Pd(OAc)<sub>2</sub>, Pd(dppe)(OAc)<sub>2</sub> and/or from π-allyl-Pd complexes, preferably π-allyl-Pd chloride dimer.
15. The process as claimed in one of claims 1-14, characterized in that the dehydrogenation catalyst, preferably the palladium salt or the palladium complex, is stabilized thermally by the presence of an additional complexing agent, preferably 2,2'-bipyridyl or 1,10-phenanthroline, preferably 2,2'-bipyridyl.
16. The process as claimed in one of claims 1-15, characterized in that the quinine used [in step (B)] is a substituted quinine, preferably a C<sub>1-4</sub>-alkyl-, halogen-, cyano- or nitro-substituted quinine.
17. The process as claimed in one of claims 1-16, characterized in that [in step (C)] the introduced protecting groups are removed by treating with a suitable acid, preferably by

treating with formic acid, acetic acid and/or trifluoroacetic acid, preferably with formic acid.

18. The process as claimed in one of claims 1-17, characterized in that [in step (C)] the resulting compound where R is hydroxyl is converted to an alkali metal salt, an alkaline earth metal salt or an ammonium salt, preferably to a salt of sodium, potassium or ammonium, preferably to a salt of sodium or potassium.
19. The process as claimed in one of claims 1-17, characterized in that the resulting compound of the formula (I) is crystallized from an apolar solvent, preferably from benzene, heptane, hexane and/or toluene, preferably from toluene.
20. The process as claimed in claim 19, characterized in that the resulting compound of the formula (I) which is  $17\beta$ -(N-tert-butylcarbamoyl)-4-azaandrost-1-en-3-one is crystallized in the polymorphic form I from a saturated solution of toluene at a temperature of about 25°C.
21. The process as claimed in claim 19, characterized in that the resulting compound of the formula (I) which is  $17\beta$ -(N-tert-butylcarbamoyl)-4-azaandrost-1-en-3-one is crystallized in the polymorphic form II from a saturated solution of toluene at a temperature of about 0°C.